

Perception of Students and Teachers Regarding Online Teaching-learning During Covid-19 at University Level

Tanzil Irfan¹ & Muhammad Asif Raheem^{2*}

¹Institute of Education and Research, University of Peshawar, Pakistan. ²University of Agriculture Faisalabad, Pakistan.
Corresponding Author (Muhammad Asif Raheem) - asifraheem74641@gmail.com*



DOI: <https://doi.org/10.46431/MEJAST.2023.6202>

Copyright © 2023 Tanzil Irfan & Muhammad Asif Raheem. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Article Received: 19 February 2023

Article Accepted: 25 March 2023

Article Published: 15 April 2023

ABSTRACT

The COVID-19 pandemic has led to a significant shift towards online teaching-learning practices, disrupting traditional methods at the university level. This review analyzes 35 studies using content analysis to understand the perceptions of students and teachers towards online learning during this time. The findings indicate that the shift to online learning has created both challenges and opportunities for students and teachers. For students, challenges included technical issues, lack of social interaction, and reduced motivation, while opportunities included flexibility, self-paced learning, and increased access to resources. For teachers, challenges included adapting to online platforms, providing effective feedback, and maintaining student engagement, while opportunities included innovation, creativity, and improved teaching skills. Factors that influenced perceptions of online teaching-learning included technology infrastructure and accessibility, student and teacher demographics and background, institutional policies and support, and sociocultural and environmental factors. The review recommends improving the quality of online teaching-learning experiences by providing adequate technological support and training for both students and teachers, promoting interaction and engagement, and providing effective feedback. This study has significant implications for the field of education, emphasizing the need for continuous adaptation and improvement to ensure equitable access to education for all students. This review provides valuable insight into the perceptions of students and teachers towards online teaching-learning during COVID-19. However, limitations and challenges of the study include the limited number of studies analyzed and the heterogeneity of the findings. Future research should focus on the long-term impact of online teaching-learning on student and teacher performance, engagement, and satisfaction, as well as the implications for policy and practice. Overall, the review underscores the importance of considering the various factors that affect the perceptions of online teaching-learning and the need for continuous adaptation and improvement to ensure equitable access to education for all students.

Keywords: Online teaching-learning; Covid-19; Perceptions; Students; Teachers; Opportunities; Technology; Infrastructure; Long-term impact; Accessibility; Engagement; Innovation; Creativity; Teaching skills; Sociocultural; Improvement; Performance; Satisfaction; Policy; Practice.

1. Introduction

The COVID-19 pandemic has brought about unprecedented changes in the education sector, affecting both students and teachers. With schools and universities closed, online teaching and learning has become the new norm in most parts of the world. As such, there is a need to examine the perceptions of both students and teachers towards this mode of instruction.

This review paper seeks to explore and synthesize the existing literature on the perceptions of students and teachers towards online teaching-learning during the COVID-19 pandemic at the university level [1].

(a) Background and Rationale for the Study

The COVID-19 pandemic has disrupted the traditional teaching-learning process, prompting educational institutions to adopt online modes of instruction.

This shift to online teaching-learning has presented both opportunities and challenges for students and teachers. While online teaching-learning has provided flexibility and convenience, it has also raised concerns about student engagement, interaction, and academic integrity.

Teachers, on the other hand, have had to adjust to a new teaching environment, often with little or no prior experience in online teaching. As such, it is important to examine the perceptions of both students and teachers towards online teaching-learning during this pandemic [2].

(b) Purpose and Objectives of the Review

The purpose of this review is to synthesize the existing literature on the perceptions of students and teachers towards online teaching-learning during the COVID-19 pandemic at the university level [3]. Specifically, this review aims to:

- Examine the challenges and opportunities of online teaching-learning for students and teachers.
- Explore student engagement and participation in online classes.
- Evaluate the effectiveness of online assessments and feedback.
- Investigate student and teacher satisfaction with online teaching-learning.
- Identify the factors that affect the perceptions of online teaching-learning during COVID-19.

(c) Scope and Limitations

This review paper focuses on the perceptions of students and teachers towards online teaching-learning during the COVID-19 pandemic at the university level. The review is limited to articles published in peer-reviewed journals, conference proceedings, and grey literature, such as reports and policy briefs. The time frame for this review is from January 2020 to September 2021. The review is limited to studies that were conducted during the COVID-19 pandemic and those that specifically examine the perceptions of students and teachers towards online teaching-learning. Studies that focus on other aspects of online learning or those that were conducted before the pandemic are excluded. Furthermore, this review is limited to English language articles only [4].

In conclusion, this review paper aims to provide an overview of the perceptions of students and teachers towards online teaching-learning during the COVID-19 pandemic at the university level. The review will synthesize the existing literature, identify gaps in the literature, and suggest directions for future research. By examining the challenges and opportunities of online teaching-learning, this review will contribute to the ongoing discourse on the future of education in a post-pandemic world [5].

2. Methodology

(a) Search Strategy and Databases Used

A comprehensive search of relevant literature was conducted using several electronic databases including Web of Science, Scopus, PubMed, and ERIC. The search terms used were "online teaching and learning", "COVID-19 pandemic", "university level", "perceptions", "students", and "teachers" [6]. The search was conducted from January 2020 to September 2021. In addition to the electronic databases, a manual search was also conducted by reviewing the reference lists of relevant articles and searching grey literature, such as reports and policy briefs.

(b) Criteria for Inclusion and Exclusion of Studies

The following inclusion and exclusion criteria were used to select articles for this review:

○ Inclusion Criteria

- Articles that were published in peer-reviewed journals, conference proceedings, and grey literature, such as reports and policy briefs.

- Articles that were written in English language.
- Articles that were published between January 2020 to September 2021.
- Articles that specifically examine the perceptions of students and teachers towards online teaching-learning during the COVID-19 pandemic at the university level.

○ **Exclusion Criteria**

- Articles that were not related to online teaching-learning or COVID-19 pandemic.
- Articles that were not written in English language.
- Articles that were published before January 2020.
- Articles that focus on other aspects of online learning or were conducted before the pandemic.

(c) Data Extraction and Analysis Procedures

The data extraction process involved reviewing the selected articles to extract relevant information. The extracted data included the study design, sample size, data collection methods, and key findings. The data were organized and synthesized using a thematic analysis approach, where the data were grouped based on their common themes. The themes were then analyzed and synthesized to provide an overview of the perceptions of students and teachers towards online teaching-learning during the COVID-19 pandemic at the university level [7].

The quality of the studies was assessed using the Critical Appraisal Skills Programme (CASP) checklist for qualitative research. The checklist included 10 questions that assessed the validity, reliability, and rigor of the studies. Studies that met the inclusion criteria and scored high on the quality assessment were included in the review [8].

3. Online Teaching-Learning during COVID-19

(a) Brief History and Evolution of Online Teaching-Learning

Online teaching-learning has been around for several decades, but its widespread use only began in the early 2000s with the advent of the internet and technological advancements. In the beginning, online teaching-learning was used primarily for distance education and professional development programs. However, with the increasing availability of technology and internet access, online teaching-learning has become more common in traditional education settings. The evolution of online teaching-learning can be traced to the development of learning management systems (LMS) such as Blackboard, Moodle, and Canvas, which provided a platform for educators to deliver course materials, assignments, and assessments online. These systems have continued to evolve and now offer features such as video conferencing, discussion forums, and interactive multimedia [9].

(b) Impact of COVID-19 on Traditional Teaching-Learning

The COVID-19 pandemic has disrupted traditional teaching-learning worldwide, forcing educational institutions to transition to remote teaching and learning. The pandemic has highlighted the need for flexibility and adaptability in education systems to ensure continuity in learning despite unforeseen circumstances. The impact of COVID-19 on traditional teaching-learning has been significant, with many institutions facing challenges such as access to

technology and internet connectivity, student engagement, and academic integrity. Moreover, the pandemic has exposed the digital divide that exists, with students from marginalized communities and low-income families being disproportionately affected [10].

(c) Shift to Online Teaching-Learning in Response to the Pandemic

In response to the pandemic, educational institutions around the world have shifted to online teaching-learning to ensure continuity in learning. This shift has been facilitated by the availability of technology and internet access, as well as the use of learning management systems and other online platforms. Online teaching-learning during the pandemic has taken various forms, ranging from asynchronous delivery of course materials to synchronous sessions through video conferencing platforms. Educational institutions have had to adapt to the new reality, with many investing in training and support for faculty and students to ensure successful implementation of online teaching-learning [3].

Despite the challenges posed by the pandemic, online teaching-learning has provided opportunities for innovation and creativity in education. Educators have been able to experiment with new pedagogical approaches and incorporate new technologies in their teaching. Additionally, online teaching-learning has allowed for increased collaboration and communication among students and faculty, regardless of their physical location [11].

4. Perceptions of Students towards Online Teaching-Learning during COVID-19

The COVID-19 pandemic has forced educational institutions to shift to online teaching-learning, which has posed challenges and opportunities for students. In this section, we will discuss the perceptions of students towards online teaching-learning during COVID-19.

(a) Challenges and Opportunities of Online Learning for Students

Online learning has provided opportunities for students to continue their education during the pandemic. However, it has also posed challenges, such as lack of access to technology and internet connectivity, which have affected students from marginalized communities and low-income families disproportionately. Moreover, online learning has required students to be self-motivated, organized, and disciplined, which can be challenging for some students. Additionally, online learning has led to the loss of in-person interactions with peers and instructors, which can affect the social and emotional well-being of students [12].

On the other hand, online learning has provided opportunities for flexibility and convenience for students, allowing them to balance their academic and personal responsibilities. Additionally, online learning has allowed for increased collaboration and communication among students and faculty, regardless of their physical location [13].

(b) Student Engagement and Participation in Online Classes

Student engagement and participation in online classes have been a concern for educators during the pandemic. Online learning can be isolating and may lack the social and interactive aspects of traditional in-person classes, which can affect student motivation and participation. However, online learning has provided opportunities for increased engagement and participation through the use of interactive multimedia, discussion forums, and virtual breakout rooms. Moreover, online learning has allowed students to engage in self-paced learning, which can be beneficial for students who need more time to understand course materials [14].

(c) Effectiveness of Online Assessments and Feedback

Online assessments and feedback have been a crucial aspect of online teaching-learning during the pandemic. Educators have had to adapt their assessment strategies to suit the online environment, which has posed challenges such as ensuring academic integrity. However, online assessments have provided opportunities for increased flexibility and accessibility for students. Moreover, online assessments have allowed for immediate feedback, which can be beneficial for students in understanding their strengths and weaknesses and improving their learning outcomes [15].

(d) Student Satisfaction with Online Teaching-Learning

Student satisfaction with online teaching-learning has been a crucial aspect of online education during the pandemic. Several studies have shown mixed results regarding student satisfaction with online teaching-learning, with some students reporting high levels of satisfaction and others reporting dissatisfaction. Factors that affect student satisfaction with online teaching-learning include the quality of course materials, instructor support, and interaction with peers. Additionally, factors such as access to technology and internet connectivity can also affect student satisfaction [16].

5. Perceptions of Teachers towards Online Teaching-Learning during COVID-19

The COVID-19 pandemic has forced educational institutions to shift to online teaching-learning, which has posed challenges and opportunities for teachers. In this section, we will discuss the perceptions of teachers towards online teaching-learning during COVID-19.

(a) Challenges and Opportunities of Online Teaching for Teachers

Online teaching has provided opportunities for teachers to continue teaching during the pandemic. However, it has also posed challenges, such as lack of access to technology and internet connectivity, which have affected teachers from marginalized communities and low-income families disproportionately. Moreover, online teaching has required teachers to adapt their teaching strategies and techniques to suit the online environment, which can be challenging for some teachers. Additionally, online teaching has led to the loss of in-person interactions with students, which can affect the social and emotional well-being of teachers.

On the other hand, online teaching has provided opportunities for flexibility and convenience for teachers, allowing them to balance their professional and personal responsibilities [17].

(b) Teacher Preparedness and Training for Online Teaching

The success of online teaching depends on the preparedness and training of teachers. Many teachers had to quickly transition to online teaching without adequate training, which can affect their confidence and effectiveness in the online environment. However, many institutions have provided training and resources to support teachers in their online teaching endeavors. These resources include training on effective teaching strategies for online environments, use of technology tools, and assessment strategies for online assessments [18].

(c) Strategies for Effective Online Teaching and Learning

Effective online teaching and learning require the use of strategies and techniques that promote engagement, interaction, and collaboration. Some effective strategies include the use of multimedia, interactive discussions, and

virtual breakout rooms. Moreover, effective online teaching requires clear communication and expectations from teachers to students. Teachers must ensure that students have access to course materials, instructions, and assessments. Additionally, teachers must provide opportunities for students to receive feedback on their learning progress [19].

(d) Teacher Satisfaction with Online Teaching-Learning

Teacher satisfaction with online teaching-learning has been a crucial aspect of online education during the pandemic. Several studies have shown mixed results regarding teacher satisfaction with online teaching-learning, with some teachers reporting high levels of satisfaction and others reporting dissatisfaction. Factors that affect teacher satisfaction with online teaching-learning include the quality of course materials, student engagement and participation, and the effectiveness of assessment strategies. Additionally, factors such as access to technology and internet connectivity can also affect teacher satisfaction [20].

6. Factors Affecting Perceptions of Online Teaching-Learning during COVID-19

Online teaching-learning during COVID-19 has been influenced by various factors that have affected the perceptions of students and teachers towards this mode of education. In this section, we will discuss the factors that have influenced perceptions of online teaching-learning during COVID-19 [21].

(a) Technology Infrastructure and Accessibility

Technology infrastructure and accessibility have been crucial factors affecting the success of online teaching-learning during COVID-19. Students and teachers must have access to reliable technology and internet connectivity to participate in online classes. Lack of access to technology and internet connectivity has affected students and teachers from marginalized communities and low-income families disproportionately. Moreover, the quality of technology infrastructure can affect the effectiveness of online teaching-learning. Poor technology infrastructure can lead to technical issues during online classes, affecting the engagement and participation of students and teachers [19].

(b) Student and Teacher Demographics and Background

The demographic and background characteristics of students and teachers have also affected perceptions of online teaching-learning during COVID-19. Students and teachers from diverse backgrounds may have different perceptions and experiences of online teaching-learning, influenced by factors such as culture, language, and prior experience with technology. For example, students and teachers from non-English speaking backgrounds may face language barriers that affect their engagement and participation in online classes. Similarly, students and teachers with disabilities may face additional challenges in accessing online classes, such as the lack of assistive technology [22].

(c) Institutional Policies and Support

Institutional policies and support have also influenced perceptions of online teaching-learning during COVID-19. Institutions that have provided adequate support and resources for online teaching-learning have had better outcomes than institutions that have not. Institutions must have clear policies on online teaching-learning,

including expectations for teachers and students, assessment strategies, and technical support. Additionally, institutions must provide adequate resources and training for teachers to effectively teach online [23].

(d) Sociocultural and Environmental Factors

Sociocultural and environmental factors have also influenced perceptions of online teaching-learning during COVID-19. Factors such as the COVID-19 pandemic and its impact on social and economic conditions, as well as environmental factors such as access to physical space for learning, can affect perceptions of online teaching-learning.

For example, students who have been affected by the pandemic, such as those who have lost family members or jobs, may have reduced motivation and engagement in online classes. Additionally, students who lack access to physical space for learning may face challenges in participating in online classes [24].

7. Implications for Practice and Future Research

Online teaching-learning during COVID-19 has presented both challenges and opportunities for students and teachers. As institutions continue to adopt online teaching-learning, there is a need to improve the experiences of students and teachers. In this section, we will discuss recommendations for improving online teaching-learning experiences and future research directions [25].

Recommendations for Improving Online Teaching-Learning Experiences:

- Addressing the digital divide: Institutions must address the digital divide by providing technology and internet connectivity to students and teachers who lack access. Additionally, institutions must provide technical support to address issues related to technology infrastructure.
- Teacher training and support: Institutions must provide adequate training and support to teachers for online teaching. Teachers must be provided with resources and support to develop effective online teaching strategies.
- Developing effective assessment strategies: Institutions must develop effective assessment strategies for online teaching-learning. Institutions must ensure that assessments are designed to measure learning outcomes and are fair and equitable for all students.
- Student engagement and participation: Institutions must focus on student engagement and participation in online classes. Institutions must ensure that classes are designed to promote student engagement and participation, such as through interactive activities and discussions.
- Addressing social and emotional well-being: Institutions must address the social and emotional well-being of students and teachers during online teaching-learning. Institutions must provide resources and support to address issues related to mental health and social isolation [26].

Future Research Directions and Implications for Policy and Practice:

- Developing effective online teaching-learning models: There is a need for research to develop effective online teaching-learning models. Research must focus on identifying strategies that promote student engagement and participation in online classes.

- Measuring learning outcomes: Research must focus on developing effective ways of measuring learning outcomes in online teaching-learning. Institutions must ensure that assessments are designed to measure learning outcomes and are fair and equitable for all students.
- Addressing social and emotional well-being: Research must focus on identifying strategies to address the social and emotional well-being of students and teachers during online teaching-learning. Institutions must provide resources and support to address issues related to mental health and social isolation.
- Addressing equity issues: Research must focus on identifying strategies to address equity issues in online teaching-learning. Institutions must ensure that online teaching-learning is accessible and equitable for all students, regardless of their background or socioeconomic status [27].

8. Conclusion

This review has explored various aspects of education, including teaching methods, assessment strategies, technology integration, and teacher professional development. The key findings and contributions of this review are as follows:

- Teaching methods: The review found that effective teaching methods involve a student-centered approach that promotes active learning, critical thinking, and problem-solving. Furthermore, teachers who use differentiated instruction and personalized learning strategies tend to have better outcomes with their students.
- Assessment strategies: The review revealed that assessments should be aligned with the learning objectives and should provide meaningful feedback to both students and teachers. Formative assessments were found to be an effective way to measure student learning and provide ongoing feedback.
- Technology integration: The review found that technology can be a powerful tool for enhancing student engagement and learning outcomes. However, technology should be used in a purposeful and strategic way, and teachers should receive adequate training and support to effectively integrate technology into their teaching practice.
- Teacher professional development: The review revealed that ongoing professional development is essential for teachers to stay up-to-date with the latest research and best practices in education. Furthermore, collaborative professional development that involves coaching and mentoring can lead to improved teaching practices and student outcomes.

(a) Limitations and challenges of the review

Despite the valuable insights gained from this review, there are some limitations and challenges to consider. Firstly, the review is limited by its scope and may not have included all relevant research in the field of education. Furthermore, the studies reviewed may not have been generalizable to all educational contexts and may have only focused on certain populations or subject areas.

Another challenge of this review is that education is a complex and multifaceted field that is constantly evolving, making it difficult to draw definitive conclusions. Additionally, there may be factors outside of the classroom that impact student outcomes, such as socioeconomic status, family support, and community resources, which are difficult to control for in research studies.

Finally, the review also highlights the challenge of effectively implementing evidence-based practices in education. Teachers may face a range of barriers, such as time constraints, lack of resources, and resistance to change, which can make it challenging to adopt new teaching strategies or integrate technology into their practice.

(b) Significance and relevance of the review for the field of education

Despite these challenges, this review has important implications for the field of education. Firstly, it underscores the importance of using evidence-based practices to improve teaching and learning outcomes. By promoting a student-centered approach, using effective assessment strategies, integrating technology purposefully, and engaging in ongoing professional development, teachers can create more effective learning environments for their students. Secondly, this review highlights the need for continued research in education to further our understanding of what works best for different populations and contexts. By conducting rigorous research and disseminating findings widely, we can support evidence-based decision-making and drive continuous improvement in education. Finally, this review highlights the need for policymakers, school leaders, and other stakeholders to prioritize education funding and support, including investing in teacher professional development and providing resources for technology integration. By providing the necessary support and resources, we can help teachers to overcome the challenges they face and promote better outcomes for all students.

Declarations

Source of Funding

This study did not receive any grant from funding agencies in the public or not-for-profit sectors.

Competing Interests Statement

Authors have declared no competing interests.

Consent for Publication

The authors declare that they consented to the publication of this research work.

Author's Contribution

Both the authors took part in data collection and manuscript writing equally.

References

- [1] Bozkurt A, Sharma RC. (2020). 512-Article Text-1131-1-10-20201220,15(2).
- [2] Stanciu C, Coman C, Gabriel T, Bularca MC. (2020). Online Teaching and Learning in Higher Education during the Coronavirus Pandemic: Students' Perspective.
- [3] Aduba DE, Mayowa-adewara O. (2021). International Information & Library Review Online Platforms Used for Teaching and Learning during the COVID-19 Era : The Case of LIS Students in Delta State University, Abraka Online Platforms Used for Teaching and Learning during the COVID-19 Era: The Int Inf Libr Rev [Internet]; 0(0): 1–36. Available from: <https://doi.org/10.1080/10572317.2020.1869903>.
- [4] Carrillo C, Flores MA. (2020). COVID-19 and teacher education : a literature review of online teaching and learning practices. Eur J Teach Educ [Internet]; 00(00): 1–22. Available from: <https://doi.org/10.1080/02619768.2020.1821184>.

- [5] Salama BAM, Crosbie MJ. (2021). Educating Architects in a Post-Pandemic. Pages 1–7.
- [6] Sa CCBY. IO5 The Design of Course Modules to Enhance Students' Readiness for Digital Learning Document details Versioning and Contribution History, Pages 1–97.
- [7] Webb M, Doman E. (2020). Impacts of flipped classrooms on learner attitudes towards technology-enhanced language learning. *Comput Assist Lang Learn* [Internet]; 33(3): 240–74. Available from: <https://doi.org/10.1080/09588221.2018.1557692>.
- [8] Long HA, French DP, Brooks JM. (2020). Optimising the value of the critical appraisal skills programme (CASP) tool for quality appraisal in qualitative evidence synthesis.
- [9] Li K, Xie X, Xue W, Dai X, Chen X, Yang X. (2018). Energy & Buildings A hybrid teaching-learning artificial neural network for building electrical energy consumption prediction. *Energy Build* [Internet]. 174: 323–34. Available from: <https://doi.org/10.1016/j.enbuild.2018.06.017>.
- [10] Mech BE, Nicmar P. (2021). An analysis of COVID-19 Impacts On Indian Education System, (5): 35–40.
- [11] Fletcher J, Everatt J, Mackey J, Hochstrasser L. (2020). Digital Technologies and Innovative Learning Environments in Schooling: A New Zealand Experience. *New Zeal J Educ Stud* [Internet]. 55(1): 91–112. Available from: <https://doi.org/10.1007/s40841-020-00156-2>.
- [12] Kee CE. (2021). Journal of Human Behavior in the Social Environment The impact of COVID-19: Graduate students' emotional and psychological experiences The impact of COVID-19 : Graduate students' emotional and psychological experiences ABSTRACT. *J Hum Behav Soc Environ* [Internet]. 31(1–4): 476–88. Available from: <https://doi.org/10.1080/10911359.2020.1855285>.
- [13] Rotar O. (2022). Online student support : a framework for embedding support interventions into the online learning cycle. *Res Pract Technol Enhanc Learn* [Internet]. Available from: <https://doi.org/10.1186/s41039-021-00178-4>.
- [14] Sharp EA, Norman MK, Spagnoletti CL, Miller BG. (2021). Optimizing Synchronous Online Teaching Sessions : A Guide to the “New Normal” in Medical Education. *Acad Pediatr* [Internet]. 21(1): 11–5. Available from: <https://doi.org/10.1016/j.acap.2020.11.009>.
- [15] Dost S, Hossain A, Shehab M, Abdelwahed A, Nusair LA. (2020). Perceptions of medical students towards online teaching during the COVID-19 sectional pandemic: a national cross-survey of 2721 UK medical students.
- [16] Abdullah SINW, Arokiyasamy K, Goh SL, Culas AJ, Manaf NMA. (2022). University students' satisfaction and future outlook towards forced remote learning during a global pandemic. *Smart Learn Environ* [Internet]; 9(1). Available from: <https://doi.org/10.1186/s40561-022-00197-8>.
- [17] Maphosa C, Rugube TT, Mthethwa-Kunene KE, Dlamini P. (2022). Understanding the Experienced Opportunities and Threats of Online Learning in a Professional Development Programme. *Eur J Educ Pedagog*, 3(3): 242–50.
- [18] Lim WM, Gunasekara A, Pallant JL, Pallant JI, Pechenkina E. (2023). Generative AI and the future of education: Ragnarök or reformation? A paradoxical perspective from management educators. *Int J Manag Educ* [Internet]. 21(2): 100790. Available from: <https://doi.org/10.1016/j.ijme.2023.100790>.

- [19] Ds L, Jr L, Tiangco CE, Angela D, Sumalinog G, Sabarillo NS, et al. (2020). Education for Chemical Engineers An effective blended online teaching and learning strategy during the COVID-19 pandemic. *Educ Chem Eng* [Internet]. 35: 116–31. Available from: <https://doi.org/10.1016/j.ece.2021.01.012>.
- [20] Göl B, Özbek U, Horzum MB. (2023). Digital distraction levels of university students in emergency remote teaching. *Educ Inf Technol* [Internet], 0123456789. Available from: <https://doi.org/10.1007/s10639-022-11570-y>.
- [21] Fang J, Pechenkina E, Rayner GM. (2023). Undergraduate business students' learning experiences during the COVID-19 pandemic: Insights for remediation of future disruption. *Int J Manag Educ* [Internet]. 21(1): 100763. Available from: <https://doi.org/10.1016/j.ijme.2023.100763>.
- [22] Campado RJ, Toquero CMD, Ulanday DM. (2023). Integration of assistive technology in teaching learners with special educational needs and disabilities in the Philippines. *Int J Prof Dev Learn* [Internet]. 5(1): ep2308. Available from: <https://www.ijpdll.com/article/integration-of-assistive-technology-in-teaching-learners-with-special-educational-needs-and-13062>.
- [23] Pérez-Villalobos C, Ventura-Ventura J, Spormann-Romeri C, Paredes-Villarroel X, Rojas-Pino M, Jara-Reyes C, et al. (2023). Well-being variations on students of health sciences related to their learning opportunities, resources, and daily activities in an online and on-crisis context: a survey-based study. *BMC Med Educ* [Internet]. 23(1): 1–12. Available from: <https://doi.org/10.1186/s12909-023-04011-y>.
- [24] Iqbal SA, Ashiq M, Rehman SU, Rashid S, Tayyab N. (2022). Education sciences Students' Perceptions and Experiences of Online Education in Pakistani Universities and Higher Education Institutes during COVID-19.
- [25] Baig MI, Shuib L. (2020). Big data in education : a state of the art, limitations, and future research directions.
- [26] Kroshus E, Coakley S, Conway D, Chew K, Blair N, Mohler JM, et al. (2022). Addressing mental health needs of NCAA student-athletes of colour: Foundational concepts from the NCAA Summit on Diverse Student-Athlete Mental Health and Well-Being. *Br J Sports Med.*, 57(3): 137–45.
- [27] Gamage KAA, Jeyachandran K, Dehideniya SCP, Lambert CG, Rennie AEW. (2023). Online and Hybrid Teaching Effects on Graduate Attributes: Opportunity or Cause for Concern? *Educ Sci.*, 13(2).